

ABSTRACT

A biochip detection system detects and locates samples that are labeled with multiple fluorescent tags and are located on a biochip. This biochip detection system includes a charge coupled device (CCD) sensor, a broad spectrum light source, a lens, a light source filter, and a sensor filter. The CCD sensor comprises two dimensional CCD arrays to simultaneously detect light waves from at least a substantial portion of the biochip. The broad spectrum light source is optically coupled to the CCD sensor and is configured to be utilized with a variety of different fluorescent tags which have differing excitation wavelengths.

The lens and the CCD sensor are optimized and matched to each other such that the sensor operates at or below the diffraction rating of the lens. Further, the resolution of the CCD sensor is matched to the samples on the biochip such that the CCD sensor oversamples each of the samples a sufficient number of times. Additionally, the lens is configured to frame at least a substantial portion of the biochip.

The biochip detection system is optimized to provide a higher dynamic range, increased sensitivity, and faster throughput compared to system utilizing laser scanners. Further, the biochip detection system is capable of utilizing a same broad spectrum light source to excite samples labeled with a variety of fluorescent tags.